

TUS Midwest
Department of Information
Technology

Final Year Project
Student Handbook
2023/24



Contents

List of Figures	iv
List of Tables	v
List of Abbreviations	vi
1 Introduction	1
1.1 Objective	1
1.2 Learning Outcomes	1
1.3 Expectations	2
1.4 Supervisors.....	3
1.5 FYP Process Summary	3
1.6 Online Facilities	4
2 Schedule	5
3 Getting Started	6
3.1 Topic Selection	6
3.2 Finding Information	7
3.3 Managing Information.....	8
3.4 Reading	9
3.4.1 How to Read Effectively	9
3.5 Writing.....	9
3.5.1 Paragraphs.....	10
3.5.2 Style	10
3.5.3 Grammar and Punctuation.....	11
3.5.4 Backup.....	12
4 Deliverables	13
4.1 Proposal	13
4.1.1 Proposal Document.....	13

4.1.2	Proposal Presentation.....	16
4.2	Literature Review	16
4.2.1	Organising and Presenting Information.....	18
4.2.2	Structure.....	20
4.3	Analysis and Design.....	21
4.4	Implementation	22
4.5	Testing.....	22
4.6	Poster	23
5	Dissertation Layout and Submission.....	25
5.1	Layout	25
5.1.1	Title Page.....	25
5.1.2	Ethical Declaration	26
5.1.3	Acknowledgements	26
5.1.4	Abstract.....	27
5.1.5	Table of Contents.....	28
5.1.6	Lists of Figures, Tables, and Abbreviations	28
5.1.7	Introduction	29
5.1.8	Literature Review.....	29
5.1.9	Discussion	30
5.1.10	Conclusions	31
5.1.11	References	32
5.1.12	Appendices	32
5.2	Format.....	33
5.2.1	Length	33
5.2.2	Line Spacing.....	34
5.2.3	Font.....	34
5.2.4	Headings	34

5.2.5	Page Numbering.....	34
5.2.6	Margins.....	35
5.2.7	Justification.....	35
5.3	Proofreading and Copyediting.....	35
5.4	Submission.....	36
5.4.1	Printing.....	36
5.4.2	Binding.....	36
6	Citations and Referencing.....	38
6.1	Plagiarism.....	38
6.2	Reference List or Bibliography.....	39
6.3	Style.....	39
6.4	How to Cite Sources.....	40
6.4.1	Some Problems.....	41
6.5	Reference List.....	42
7	Figures and Tables.....	44
7.1	Placement and Sizing.....	44
7.2	Labels and Captions.....	47
7.3	Order of Insertion.....	48
7.4	Quality.....	48
7.5	Citing Sources.....	49
8	Technical Interview.....	50
9	Ethics in Research.....	51
10	General Advice.....	52
Appendix A – Sample Title Page.....		53
Appendix B – Sample Ethical Declaration.....		54
Appendix C – Sample Cover and Spine Binding.....		55

List of Figures

Figure 1. Sample Reference List	42
Figure 2. Sample figure kept small	45
Figure 3. Sample figure using the page width	45
Figure 4. Sample Landscape Figure	46
Figure 5. Sample figure with citation (Corcoran, 2019)	49

List of Tables

Table 1. Generic FYP schedule and Marks	5
Table 2. Sample Table	47

List of Abbreviations

APA	American Psychological Association
CNSM	Computer Networks and Systems Management
CSO	Central Statistics Office
FYP	Final Year Project
IEEE	Institute of Electrical and Electronics Engineers
ISD	Internet Systems Development
IT	Information Technology
TUS	Limerick Institute of Technology
PDF	Portable Document Format
VLE	Virtual Learning Environment

1 Introduction

The purpose of this handbook is to provide final year undergraduate students in the Department of Information Technology (IT) with practical information and the guidelines, rules, and regulations that apply to the final year project (FYP). The FYP presents you with an opportunity to apply best practice to the research, design, implementation, and test of an IT system. This document aims to guide you through the FYP process, and is of particular relevance to the following courses:

- Computer Networks and Systems Management (CNSM)
- Software Development (SD)
- Internet Systems Development (ISD)

It contains information on the stages of the project, indicating when reports are due, and how to write concise and legible documents with good literary style, presentation, and layout.

1.1 Objective

The objective of the FYP module is to develop skills in independent research and presentation. The project will give you an opportunity to practice and, where necessary, improve your analytical skills in situations where there may not be a single, simple, correct solution. It is your responsibility to pursue the problem and reach the best outcome within the resources and time available. In many cases, a seemingly insurmountable obstacle may present itself during the course of the project, and some quick lateral thinking may be required to move beyond this and achieve a useful result. The FYP is normally a very enjoyable and worthwhile experience, but you will only reap the rewards with a significant effort.

1.2 Learning Outcomes

On completion of this module, you should be able to:

Conduct research using appropriate techniques for information gathering, organisation, interpretation, analysis, and synthesis.

1. Carry out a project in a professional and ethical manner.

2. Apply appropriate project management methodologies.
3. Develop requirements for a technical implementation or deployment.
4. Apply standards, best practices, design guides, patterns or other appropriate means to develop a technical design.
5. Document a technical design.
6. Build a technical implementation based on a documented design.
7. Present the results of the testing of a technical implementation in a clear and concise manner.

1.3 Expectations

The FYP is compulsory and 100% based on continuous assessment, and this is collated for the summer examinations session. The module has either 15 (CNSM) or 10 (SD/ISD) credits spread over the academic year, so is the equivalent of a module in each semester, and two in the second for CNSM. However, it is likely that you will need to spend more time on the FYP than other modules, and the FYP carries more weight than other modules in certain ways. The FYP is an assessment of performance away from a formal examination, and, as such, the grade achieved is an indication to employers of the student's ability to perform in a work environment. The project will demonstrate your work ethic, level of initiative, determination, and approach to problem-solving, and whether you are adaptable and able to think laterally when presented with difficult situations. The project also gives an early indication of project management skills, as you are largely responsible for your own programme of work. The project module is also effectively a test of your general IT ability.

Your performance during your FYP often forms the basis of any reference prepared by the supervisor for a potential employer. In addition, the external examiner may use your FYP report to help decide between borderline degree classifications in the summer examination results.

There is one FYP lecture per week, which is aimed at guiding you through the FYP process and presents information and advice on each stage of the FYP journey. You are expected to attend this lecture and it is in your interests to do so.

1.4 Supervisors

Each student is allocated a research supervisor, who is available to meet with you for 20 minutes of each teaching week for the duration of the FYP. You should note that the FYP is entirely your own responsibility. The primary role of the supervisor is that of an advisor. You are expected to meet your supervisor at the appropriate times that they will arrange with you. Supervisors will have several students to advise, so you must ensure that you make the most of your time with them. You should be aware that any criticism offered by a supervisor is not in any way personal and is a necessary part of the research process aimed at improving the result. Your supervisor can help you with the following:

- ✓ help to familiarize you with the FYP process
- ✓ clarify expectations from both student and college viewpoints
- ✓ enforce and/or encourage planning and a disciplined approach
- ✓ keep you to the boundaries and structure of the FYP
- ✓ provide motivation and encouragement
- ✓ offer suggestions for reading, and give general support
- ✓ be available to meet you at the agreed times
- ✓ give constructive criticism and positive feedback
- ✓ read draft sections of the FYP and give feedback
- ✓ approve any request that is directed to an external organisation, i.e. companies, state bodies, etc.
- ✓ advise with respect to the use of reference citations
- ✓ advise on ethical issues relating to your project

However, supervisors will not get actively involved with your project, prepare reading lists for you, or give you an indication of the final mark for your FYP.

1.5 FYP Process Summary

Learners typically carry out preliminary reading and develop an initial proposal as part of their work placement. The project topic must be related to IT. The initial ideas are developed into a more detailed proposal, which is approved by the project supervision team before the project can proceed. The project proposal must demonstrate that the learner has carried out preliminary

research and has considered the project relevance, technical complexity, feasibility, and scope. The proposal must also include a project plan, list of required resources and proposed final deliverables. The project plan should be reviewed and updated regularly during the project in conjunction with the supervisor. After the detailed proposal is approved, the learner must produce a documented design of the IT system to be implemented. The design should include inter alia, requirements, functional specifications, design trade-offs, description of design approach, risks, comparative analysis, design calculations, models, and design standards. The design must be approved by the project supervisor before implementation begins. After design approval, the learner must build a prototype of the design for testing. The implementation must be carefully documented such that anyone skilled in the discipline could accurately reproduce the implementation. A series of test cases must be developed that demonstrate the operation, functionality, performance, limits, etc., of the implementation. Test results must be appropriately recorded, analysed and documented. The final project outcomes are presented by the learner in a final project technical report (dissertation and poster), a demonstration of the implementation and a technical interview.

1.6 Online Facilities

Much of your engagement with the module is through online resources. These are currently provided by the Moodle Virtual Learning Environment (VLE) and there will be a specific page created for the FYP module, which will appear under your module list for the appropriate semesters of your course. The VLE will be used to provide you with copies of lecture slides and other supporting material to help you with your work. You will also submit chapters and other material to the VLE to meet appropriate deadlines.

There are many references to using certain tools for word processing in this document. They refer to Microsoft Word and if you are using an alternative word processing application, then you will have to find out how to use the equivalent tools in whatever you are using. Microsoft Word is freely available to all TUS students as part of Office 365.

2 Schedule

To ensure that the FYP is completed within the appropriate timescale, you should consult the published FYP Schedule on the VLE. You are expected to submit specific deliverables according to the schedule and these must be submitted by the deadlines for the FYP to be completed. Table 1 shows indicative deliverable dates for a generic academic year. Please note that a specific schedule with actual dates will be provided for your year on the VLE.

Generic FYP Schedule			
	Week	Deliverable	Marks
Semester 1	1		
	2		
	3	Working Title & Aim	
	4	Proposal	
	5	Proposal Presentation	
	6		5%
	7		
	8		
	9	Literature Review	
	10		10%
	11		
	12		
	13	Analysis & Design	
	14		5%
	15	EXAM WEEK	
	Week	Deliverable	Marks
Semester 2	1		
	2		
	3	Implementation	
	4		5%
	5		
	6	Testing & Results	
	7		5%
	8		
	9		
	10	Dissertation and Poster final drafts	
	11		10%
	12	Technical Interview and Poster Presentation	
	13	Formal Bound Copy of Dissertation	10%
	14		50%
	15	EXAM WEEK	

Table 1. Generic FYP schedule and Marks

3 Getting Started

3.1 Topic Selection

The selection of the topic forms the basis for the FYP and is of particular importance. If you do not choose a suitable topic, you are unlikely to produce a good FYP. The topic should be one that interests you, relates to your course of study, indicates an area worthy of enquiry, and should aim to provide a contribution to the existing research body on the topic. IT FYPs must also contain a practical implementation that relates to your topic. This may consist of, for example, the construction of a network topology or the development of a computer application to address research questions that you wish to answer.

Your Work Placement during third year is the ideal starting point for the development of ideas and topic selection for your FYP. Where possible, you should work with your industry placement supervisors to generate ideas. In many cases, companies face problems and issues that could be readily addressed through the development of solutions encapsulated as an FYP, and many companies are more than willing to explore these ideas with their placement students. The FYP Assignment during Work Placement is of particular importance for this, and you should have a well-developed topic by the time you begin your final year.

It is also important to work with your FYP Supervisor on the development of your topic. It is common for students to choose topics for FYPs that are too broad and that are difficult to research. In this case, topics need to be revised in order to achieve a narrower focus that is feasible to research over the course of the project. It is also advisable to select an area in which there is already an existing body of research and published material. Otherwise, it may be difficult to find enough background information to conduct a proper Literature Review. You should remember that most contributions to research and practice are relatively small and address very specific problems and research questions.

If you do not already have a sound topic selected, you might be able to generate some ideas by looking at what students have done in previous years.

Many good FYPs will contain suggestions at the end of the thesis for further research in the area, and you may be able to develop some of these ideas into an FYP. Other sources of ideas for research topics are IT periodicals, magazines, blogs, and forums. The most important thing is to read as much as you can around your chosen area.

No matter what, ensure that the topic you select is non-trivial, shows your ability to identify your deep interest in the topic and the underlying reason why that topic interests you. Make sure you survey what others have done to solve the same problem you are attempting to solve now and ensure that you do not blindly duplicate the work done by others. In the end, you must be able to clearly explain the reasons how you chose the procedure/approach that you adopted to solve the problem and its underlying basis.

3.2 Finding Information

Most of the information you will need comes from books, research papers published in journals, and conference proceedings. Most of these sources can be found online and there are specialist tools to help you search for them. Most searches will begin with a standard Google or Bing search, and that is fine but will only get you so far. A far better technique is to use Google Scholar (scholar.google.com), which is a freely accessible web search engine that indexes the full text or metadata of scholarly literature across an array of publishing formats and disciplines.

The TUS Library has a good number of online databases available for you to search. The most relevant ones for IT are probably Emerald Insight, IEEE Electronic Library, and ScienceDirect. There is a global search tool called EBSCO Discovery Search you may find useful.

The Web itself can be a good source of general information, and you will find many online articles, opinion pieces and blogs that will provide useful background material. Although these can be cited, remember that your literature review should be largely composed from sources of established research and studies which have been peer reviewed. Many IT studies also

need to include technical specifications, manuals, reports, and white papers as sources, and it is perfectly acceptable to do this.

Another good source of information can be the work of students who have completed FYPs, Masters and even PhDs. The TUS Library contains a good number of FYP and Masters' Dissertations that may be relevant. Many higher education institutions keep repositories of these documents online and you may find some of them in online searches. Remember that any of these sources must be cited correctly, according to what type of source they are (see Section 12 for details).

If you are looking for technical definitions or explanations, Wikipedia is a good place to start. Contrary to what you may have heard (even from some lecturers), Wikipedia is a very reliable and accurate source of information for technical subjects. Furthermore, technical articles tend to have a high number of citations and can be a good source of references for your work.

The TUS Library run several training sessions on information searching during the academic year and you may find it very useful to attend one of these.

3.3 Managing Information

During your project, you will access a lot of sources, and you need some way to keep track of these. It is good practice to keep track of what publications or abstracts have been looked at, both to be able to find the material again quickly when you need it, and to avoid wasting time looking up the same source several times. There are some tools to help you with this and the two most widely used are EndNote and Mendeley.

EndNote is a commercial reference management software package, used to manage bibliographies and references when writing dissertations, essays and articles. TUS has a site licence for this and you are entitled to install and use it on your own devices while you are a student. EndNote plugs in to Microsoft Word and helps with your citations and formatting of your Reference List or Bibliography.

Mendeley is a freeware reference management application that you can download and use. Some students prefer it to EndNote because it is probably easier to learn how to use, but it does not have the same number of features. There is also a basic Referencing tool in Word that you could use to manage your sources, and which will produce a reasonable Reference List, but it is very limited in functionality compared to EndNote or Mendeley.

3.4 Reading

You will need to do some initial reading to sensitise yourself to the subject, however it is a mistake to think that you need to read everything before you start writing. In fact, sometimes students can become so absorbed in the reading that they find it difficult to start writing. Do not feel that you need to read everything before you can start. The writing should drive the reading. As you write you will figure out where the gaps are in your knowledge and your reading will become more focused.

3.4.1 How to Read Effectively

Sometimes it can be difficult to penetrate a text. The key to getting the most out of your sources is being able to develop effective reading skills. Read actively.

- ✓ Read abstracts of articles to decide if they are relevant to your topic.
- ✓ Skim and scan the article to get an overall feel for the structure of the argument, paying attention to headings.
- ✓ Using a highlighter and a pen make notes, taking one paragraph at a time.
- ✓ Sum up the key point in each paragraph.
- ✓ Look for patterns of ideas across the articles you read.
- ✓ Highlight difficult language and unpack terminology.
- ✓ Identify the writer's agenda and underlying values.

3.5 Writing

A blank page can be very daunting, but it is vital that you start writing from the very beginning. Set daily or weekly goals so that you do a little often rather than binge writing. It is very difficult to build up the momentum to start again

after a long break. It is better to set aside discrete time every day when you do some writing. By writing little and often you allow yourself more time to critically reflect on your work. Try not to be precious about the initial writing, aim to get words down on paper. Writing tends to flow more freely once you have something written. These initial words may not appear in the final draft, but they will serve their purpose if they get you going.

A good place to start is by mapping out the overall structure of your project. Identify the key headings and then make bullet points under each of these headings. These bullet points can be worked up into paragraphs. It is important to have a solid underlying structure upon which to hang your ideas.

3.5.1 Paragraphs

Being able to use paragraphs effectively will significantly strengthen the quality of your work. A paragraph is a stylistic tool which allows you to structure your discussion. A common error for students is to randomly press the return key and begin on a new line for no good reason. Paragraphs should not be too short as too many short paragraphs make for a disjointed structure. The main thing to keep in mind is that all paragraphs have a coherent purpose. A properly functioning paragraph is a device which allows the reader to consider one main unified idea. Take note of how this document is generally laid out in proper paragraphs.

The first line or so of the paragraph should give the reader a clear indication of the issue about to be discussed and should clearly signpost the direction of the argument. You should be able to go through your document and summarise each paragraph into a key sentence.

3.5.2 Style

For most academic work you will be required to adopt a style which demonstrates rhetorical neutrality. In some circumstances and in some disciplines a more personal voice may be appropriate (e.g., for reflective pieces or sections), but for the most part it is advisable to keep some critical distance. Students often adopt a style which is too journalistic and opinionated. Rather than aiming to give the reader unsupported personal

opinion, aim to give the reader considered critical evaluation based on close and detailed analyses of the evidence, data, literature or theories with which you are working. Support your position with reference to the research of others. The examiners will be able to determine your ability to think independently by evaluating the way in which you have been able to analyse and critique your sources. The following advice is based on addressing frequent errors which appear in student work.

- ✓ Aim for a neutral, critical voice.
- ✓ Avoid styles which are journalistic, personal, or overly opinionated.
- ✓ Avoid introducing your ideas by saying 'in my opinion' or 'I think'. Instead identify the key issues at stake or the questions raised and discuss with reference to good academic sources.
- ✓ Do not use abbreviated forms or contractions such as 'don't' or 'can't', these are too informal.
- ✓ Communicate for clarity- often students attempt to impress examiners with complicated sentence structures and unnecessary verbiage.
- ✓ If the sentence is too long and complicated, then the meaning will get lost and the reader will have to work too hard to figure out what you are trying to say. Shorten sentences when they become too unwieldy.
- ✓ Keep it simple, effective, and clear. One of the hardest things to learn about writing is to write simply.

3.5.3 Grammar and Punctuation

Correct use of grammar and punctuation are essential to the quality of your writing. There are several basic rules that you must know to be able to write properly. Fortunately, there are several tools to help you to correct mistakes as you write. The built-in in spelling and grammar checkers in Word are good and should be used at a minimum. There are also specialist tools available for checking these, such as Grammarly, which is a free application that you can download, and it operates as a plug-in with Microsoft Office applications. Students whose first language is not English may find this particularly useful. There is also a Speak facility in Word where it will read a piece of highlighted text back to you. If it does not sound right, then you probably need to rewrite

it. You should be aware that, when you work closely with a document for any length of time, it becomes increasingly difficult to spot errors. Therefore, it is most important that you ask somebody to proofread your work for spelling, punctuation and grammar.

3.5.4 Backup

Remember to back-up your work regularly saving it to several locations. Make sure that the auto-save function is set up so that it saves versions of your work every few minutes as you work. Use cloud storage such as One Drive so that you always have a copy of your work available. Remember to back up your references as well if you are using Endnote or Mendeley.

4 Deliverables

Assessment of the FYP is continuous over both semesters and each deliverable attracts a percentage of the overall marks, set out in Table 1. Whilst your supervisor will give you feedback on your progress throughout the year, the marks are only collated for the Summer Examination Board, and you will receive your final grade with your other Semester 2 results.

The Literature Review, Analysis & Design, Implementation, and Testing deliverables each represent a chapter in your final dissertation, and you should remember this as you are producing them. They can be updated and edited for the dissertation, but the more work that you put into them, the less work you will have to do at the end.

4.1 Proposal

The FYP proposal is an important first step in the development of your project. You must have a well-developed proposal to present to your supervisor and a panel before you will be allowed to proceed. The proposal has two main parts. The first is the proposal document which you work on with your FYP Supervisor and the second is a formal presentation of your proposal which is to your Supervisor and other members of the FYP supervision team, normally a panel of two or three.

Remember that the FYP Proposal is the start of your research journey and not the end. Whilst your proposal should be as fully developed as possible, your aims and objectives are likely to change somewhat over the course of your journey. This is a normal part of any research project.

4.1.1 Proposal Document

The Proposal Document will form the basis for discussions and development of your ideas with your Supervisor. It is very important that this document is presented properly and is clear and concise. The document should not be overly long, perhaps four or five pages. At this stage, it is crucial to get off to a good start so your document should be presented in a professional manner with great attention to detail. You should follow the same format as that for the Dissertation (apart from Margins), and details can be found in Section 5.2.

It is advisable to create a document template at this stage so that all your submissions from now on correspond to the required format. You will be shown how to create documents and templates in the FYP Lecture, and you should keep these safe and use them for all your deliverables.

4.1.1.1 Title

Your title should be as short as possible but should also reflect what your project is about. Titles take considerable time and effort to get right, and it is likely that you will have several versions of your title before you complete your dissertation. Therefore, you should consider your title to be a working title (a work in progress) which should be refined as your project develops. In general, keep it short by deleting unnecessary words. Using a colon can be a useful way to shorten titles, and do not use abbreviations or acronyms in them. Make sure that you check the spelling and grammar of the title and that it is presented in a clear and attractive style.

4.1.1.2 Aim

This is a general statement that outlines what the problem you are trying to address is and why it is important to address it. It can also be considered as a problem statement, which is a concise description of an issue to be addressed or a condition to be improved upon. Anyone reading the aim of your project should get a clear idea of what it is you are doing and why.

4.1.1.3 Objectives

This is a more detailed piece that develops the Aim into several specific and achievable objectives that you hope to achieve. The objectives can include several elements including practical deliverables and specific research questions that you are trying to address. Every research project must address at least one very specific question and most projects will address more than one.

4.1.1.4 Background

This is where you justify your proposal, and it will typically be the longest piece of your document. It should be developed in a way that it forms a basis for your upcoming Literature Review. You need to provide evidence that you

have read around your topic, that you understand why it is important and establish the relevance of your study. You need to include several citations to show that you have carried out some preliminary investigation in developing your research ideas. This section should also capture the development of your thought processes from the conception of your idea to your current proposal for the project, and it is acceptable to write in the first person to do this.

4.1.1.5 Research Approach

This is a precursor to your Methodology section in the dissertation. You need to consider how you will approach your research. What are you going to design, build and test to solve the problem that you have outlined? What materials, equipment, and facilities do you need to achieve this? Do you need any of these to be provided by the college? These are all things that need to be considered at the beginning of your project. Although your methodology will be far from fully developed at this stage, you need to consider certain aspects of your research approach to demonstrate that what you propose is doable and achievable.

As part of the research approach, you should consider how you will manage your time. This is particularly important as you will have periods where you cannot give the project as much attention as you would like due to other commitments such as studying for end of Semester exams. Applying some project management techniques such as Gantt Charts may be useful here.

4.1.1.6 Potential Outcomes

If you have clearly thought out and defined aims and objectives, then you will have some idea of where your project will lead you. You can anticipate your hoped-for outcomes if your work is successful. The final result may not match these but that may not mean that you will have a bad research project. It is common that unexpected outcomes make for good conclusions to projects. At this stage, you are only showing that you have some idea of what the final product is going to look like and what it will achieve.

4.1.1.7 Bibliography

The bibliography is a list of what you have read in the preparation of the Proposal Document and includes references that you have cited. All citations and references must be correctly presented in the Harvard (TUS) style. You can find full instructions on how to do this in the library and there will be instruction given during the FYP lecture. See Section 6 for further details.

4.1.2 Proposal Presentation

You will have to present your proposal at a formal Proposal Presentation. The panel for this will consist of your supervisor and one or two other members of academic staff in the Department of Information Technology, most likely lecturers from your course who have knowledge and expertise in the field that you are investigating. You will be required to give a ten-minute presentation using slides (PowerPoint, Prezi, Canva, etc.), and this will be followed by questions from the panel exploring the ideas and approach that you have presented. The panel will confer to inform a grade for the assessment of your proposal and this contributes towards your final grade for the FYP.

4.2 Literature Review

The Literature Review literally refers to a review of existing publications on the subject of your project, or subjects that are related to it. At the start of your project, you will spend a lot of time reading and researching to find out what work has already been done in the area of your project, largely to ensure that you are not trying to do something that has been done already. A literature review chapter generally serves three main purposes.

1. To bring the reader up to speed on background information they will need to know to appreciate the relevance of the original work described later in the dissertation. At the conclusion of the chapter, the reader should know what is currently happening in the area that you are working in.
2. To establish your credentials in the mind of the reader (especially if the reader is a project examiner). By demonstrating that you have carried out sufficient research and reading in the area, you reassure the reader that you are knowledgeable about the area and are able to make

sensible choices about the direction of the project. If the literature review is inadequate, the reader will be left wondering whether your work has simply gone over old ground, reinventing the wheel. The reader may also be uncertain what benchmark your original work can be measured against.

3. To establish the rationale for your project. The Literature Review is about researching the background to your project and should be written in such a way that it underpins your rationale for undertaking the project, possibly by identifying gaps in the research literature or by providing solid evidence as to why your project is worthwhile.

For an FYP, the Literature Review should be at least several pages in length and should contain many references to reputable publications. The number of references per page will probably be considerably higher in this section than in any other part of the dissertation, other than perhaps parts of the Introduction. This chapter should describe and reference existing work that is as close as you can find to what you are undertaking in your project, so that the reader can see where your original work fits into the landscape of existing knowledge in the area. For example, if you're designing the control application for a solar-powered refrigeration system for developing countries, you need to find and describe several existing systems that are as close as possible to what you are doing so that the reader can see what is new and different about your design (e.g., cheaper, more efficient, safer, etc.).

The Literature Review should focus only on reviewing existing knowledge in the area and work done by other people. Do not begin describing the details of your own work yet. Of course, it's fine to mention aspects of your own project by way of explanation when you review a particular topic. However, there must be a clear dividing line between the end of this section and the beginning of the next, which separates your description of other people's work from your description of the work that you yourself are doing. That way, the reader (and most importantly project examiner) will be in no doubt as to what work you carried out yourself.

4.2.1 Organising and Presenting Information

A Literature Review is not simply a list of relevant references, each considered in isolation. In addition to conveying an understanding of the topic, a good Literature Review critically evaluates key ideas and observations while making meaningful comparisons between the works of various authors. In reviewing the work that has been performed on a particular topic to date, it should be possible to identify knowledge gaps or inconsistencies, which may form the basis for future experimental work.

Read the sources soon after finding them. Read the Abstract for pointers to the objective, methods, and main observations. Check the Introduction for useful references. In the Methodology sections, make a note of experimental techniques, conditions, or designs which may be of relevance to your work. From the Results and Discussion sections, form a clear picture of the topic under consideration. If you have read other articles dealing with the same subject, consider how the results are corroborated or contradicted by this work.

As early as possible, establish a structure or plan for your review. This may, of course, be modified, as you become more familiar with the subject, but it is useful for arranging material into coherent and manageable units. Decide on the main theme(s), which will ultimately be contained, in sequentially numbered sections and sub-sections, between an Introduction and a Conclusion.

Do not wait until you have read (and re-read) every reference in your possession before beginning to write. Using your proposed structure as a starting point, make sub-headings for each section. Allocate ideas and substantiating references to each. Reorganise these sections into a logical order as the structure develops.

Take particular care in referencing material. Ensure accuracy in conveying the ideas or results of other workers. Use a consistent, comprehensive referencing system, allowing the reader to easily access the original source material. Remember that tables and figures must be referenced, as well as text.

Consciously avoid plagiarism, which is direct quotation or word-for-word transcription, mixing paraphrase and unacknowledged quotations, or unacknowledged paraphrase and/or use of ideas. It is essentially using someone else's work without acknowledging it. In student works, plagiarism often results from either ignorance or carelessness. By familiarising yourself with both the letter and spirit of the definition provided above, carefully documenting all reference sources and taking the time to summarise material in your own words (as well as subsequently verifying the accuracy of your summary), plagiarism can be avoided.

In presenting the Literature Review, take care to make the material accessible to the reader. Careful use of tables and figures may avoid lengthy and confusing lists of facts. Sub-sections (with headings), each addressing a single theme or idea, are preferable to one, uninterrupted chapter.

A literature review is **not** an annotated bibliography. In an annotated bibliography, the writer presents a summary and critical evaluation of each article or scholarly resource, one by one. There little or no connection made between the various articles or resources. A literature review is also **not** an essay. Essays and literature reviews have a very different purpose and require different approaches. In an essay, you are given a topic to discuss or a question to answer and your writing is organised around responding to that topic or question. The essay progresses in a linear way, where you present your first point, followed by an explanation, which is supported by the literature. You then move on to the second point and so on. In an essay, the literature has a supporting role; in a literature review, it is the literature itself that is the subject of discussion.

In the literature review, you **will** identify a gap in existing knowledge, that is, you will identify what we still need to know about this topic or issue, and pose a question related to this gap. This will be your research question, and you will need to compare and contrast different authors' views on it. You should note areas in which authors are in disagreement, highlight gaps, or identify any particular shortcomings of past research. In this way, your literature

review becomes a critical discussion of the knowledge or ideas related to your research topic.

4.2.2 Structure

The body of your literature review will be organised in way that best suits your topic, and there are a few ways of doing this.

- ✓ **Historically/chronologically** - if you are looking at the evolution of a concept or practice over time or evaluating whether a concept from 20 years ago holds up today, then a historical or chronological organization might be appropriate.
- ✓ **Research questions** - some writers organise their literature review around the research questions.
- ✓ **Themes** - a very common way to organise the literature is according to key themes that emerge from the literature in relation to your topic, and thematic presentation is most widely used for literature reviews in technical research.

4.3 Analysis and Design

The design, implementation, and testing phases of your project are very much intertwined and the process is very similar to the *Scientific Method*, which is a cyclical approach to experimentation. An experiment is designed to answer a particular question (hypothesis), built from the design, and then tested with appropriate test data. Based on the results of the test, which may prove that the design and build worked, or not, the design and build may be changed, and then retested. It is essentially an iterative process of learning.

The design and build phases of a research project are typically known as the *Methodology*. Because of the emphasis on the practical implementation of a system for IT FYPs, it is treated a little differently for these projects, and subdivided into two sections: *Analysis & Design* and *Implementation*. These are two separate deliverables during the course of the FYP but may be combined into one Methodology section in the Dissertation if it suits the purposes of your project.

The Analysis and Design section will contain a clear and complete account of the finished design for your project, and how you went about developing it. This can include circuit diagrams, sections of code, flow charts of algorithms, schematics of manufactured components, graphs, etc. Diagrams should be professional looking, so use the right sort of drawing tool. If you are still struggling along with MS Paint or something similar, now is the time to take a leap of faith and get to grips with something more appropriate. Microsoft Visio is a powerful tool for producing diagrams, layouts, and flowcharts, and is available to TUS students as part of the Microsoft Office 365 suite of applications. Inkscape is a good, freeware application to create or edit vector graphics such as illustrations, diagrams, line arts, charts, and logos; Draw.io is a cloud-based free application for creating flowcharts and diagrams, and there are many other options depending on your needs. See Section 14 for information on working with figures and tables.

Make use of photos and screenshots. These provide some of the best value of all in terms of benefit to the reader versus effort by the author. It only takes a second to snap a picture of something while you are working on it, but often

it can communicate something complex to the reader much more effectively than a written description. There is a new tool in Microsoft Word that makes screenshots very easy. You can find it under *Insert>Screenshot>Screen Clipping*.

4.4 Implementation

The Implementation section is similar to the Analysis and Design section in that it describes the system, but it does so at a finer level of detail, down to the code or hardware level. This section is about the realisation of the concepts and ideas developed earlier. It can also describe any problems that may have arisen during implementation and how you dealt with them. The Implementation section is submitted as a deliverable during the FYP and may be presented somewhat differently in the Dissertation. For example, depending on the nature and detail of your project, the Implementation might be combined with Testing in a Results section of the Dissertation. See Section 5.1 for details of suggested layouts for the Dissertation.

The Implementation section is a detailed, written description of the work that you carried out to build and implement your design. You should describe the steps that you took to build your system, describing the tools and environment that you used and why you used them. Similar to the Analysis and Design section, you should make extensive use of figures, screenshots, etc. However, these should only be used to reinforce your written description. For example, if you wish to talk about a particular piece of code or function that appears in your system, you may wish to insert that as a screenshot or import it from the IDE that you are using, and then describe it. Longer sections of code should probably be presented as an Appendix. It is important to remember that these sections are pieces of writing supported by figures, and not a stream or succession of pictures or screenshots.

4.5 Testing

Students often fall into the trap of neglecting their report to focus on the practical work, which results in a disastrous loss of marks. Similarly, many students focus on unrealistic, grand plans for something they are building, and end up leaving almost no time at all to rigorously test its performance. In

an IT or engineering project, it is not enough to implement – you need to test thoroughly as well.

You need to measure some hard and fast numbers that capture useful information about the performance of whatever you have built. If the results of your tests include tables of measurements and graphs, that is all the better. If no tables or graphs of results appear anywhere in the report, that will sound alarm bells in the minds of most examiners.

When presenting results, it is critical that you also provide detailed information about the circumstances under which they were obtained. There are many established methodologies for testing IT systems, particularly in software development. You need to include a description (with citations) of any testing methodologies that you used, and why you used them. For example, you would explain why a particular test methodology was useful for your project compared to an alternative. It may be helpful to consult some standards for testing, such as the *ISO/IEC/IEEE 29119 Software and Systems Engineering -- Software Testing* documentation, particularly if you are developing a software application as part of your project.

4.6 Poster

The creation of a poster is common in research projects, and it can be used for several things. It is a showcase of your work and good posters will be displayed in some of the IT labs and may be used elsewhere by the Department. You will use it to help present your work at the Technical Interview and the development of the poster can be a great way to draw all the strands of your work together when you are preparing for this. The poster is A0 in size so you will have plenty of room to fit in aspects of your project. The main thing to remember when developing the poster is to make good use of graphics and avoid an overreliance on text. You should not simply copy large chunks of text from your Dissertation and paste them into your poster. You will be shown examples of what works for posters and there are plenty of examples available online.

The poster is essentially an illustrated abstract, so it will touch on all aspects of your work. There are some conventions that you need to follow, and you need to include information on the different areas of the project. The poster is A0 in size and should be full colour, 300 DPI. Make sure that you only use high-resolution images, as low-quality images may look blurred at this scale. The orientation can be Portrait or Landscape – whichever suits your design. You need to include information on the following:

- ✓ Department of Information Technology Logo
- ✓ Title (as it appears on your Dissertation).
- ✓ Your name and student ID number.
- ✓ Supervisor's name
- ✓ Introduction/Background
- ✓ Aims and Objectives
- ✓ Methodology
- ✓ Findings
- ✓ Technology Used
- ✓ Conclusions

The poster needs to be submitted as a PDF and printed for the Technical Interview. There are large format printers available through the Computer Services Department, or you can get the poster professionally printed in a print shop (much more expensive). You do not need to get the poster laminated, and nor should you as it is a very environmentally unfriendly practice.

5 Dissertation Layout and Submission

A final year project in computer science usually involves a substantial amount of practical work, whether it be design, analysis, programming, prototype development, testing or something else. Undertaking this aspect of the project in a professional manner and delivering something impressive at the end are naturally important steps towards a good grade for your project. However, producing a good report is just as important and a critical factor in securing a high mark. The project report is an aspect of the project in which many students fall dramatically short of their potential. It is tempting to focus for too long on the practical work and neglect the report until it is too late to write anything that does complete justice to your practical achievements.

5.1 Layout

The following is the suggested layout for the Dissertation. You should follow this as closely as possible, but there may be some flexibility around how you present the Methodology and Results sections to suit your project, and you can work with your Supervisor on these.

- A. Title Page
- B. Ethical Declaration
- C. Acknowledgements
- D. Abstract
- E. Table of Contents
- F. Lists of Figures, Tables, and Abbreviations
- G. Introduction
- H. Methodology (Analysis and Design/Implementation)
- I. Results (Implementation/Testing/Findings)
- J. Discussion
- K. Conclusions
- L. Reference List/Bibliography
- M. Appendices (supporting materials)

5.1.1 Title Page

The title should indicate the subject matter of the Final Year Project unambiguously. This is most likely what most readers will look at first and so

it deserves careful attention. The title needs to capture **accurately** the essence of the entire piece of work in a clear and brief fashion. You should be aware that the title may take some effort to get right and will probably go through many iterations before it fully reflects your work. You should avoid catchy titles. In general, keep it short by deleting unnecessary words. Using a colon can be a useful way to shorten titles, and do not use abbreviations or acronyms in them. Make sure that you check the spelling and grammar of the title and that it is presented in a clear and attractive style. See Appendix A for a sample Title Page – please follow this format.

5.1.2 Ethical Declaration

The Ethical Declaration is a formal statement declaring that what you have produced is your own work, that you have followed all the guidelines and regulations for the FYP, and that you have acknowledged the work of others as appropriate. It also contains some text regarding your ethical approach to the research. You can find information about research ethics in Section 9. You are required to sign and date the Ethical Declaration, and the text and sample layout is shown in Appendix B. Do not just include and sign this thoughtlessly. You need to take the opportunity to reflect on whether every part of your document that has originated elsewhere (whether it be text, images, diagrams, or anything else) has been clearly marked as such, and whether the original author or authors of any such content have been properly credited.

Remember that your FYP Dissertation is likely to be available for others to read for the rest of your life. You should be very careful not to expose yourself to a potential accusation of plagiarism now or at any point in the future. If you are uncertain what does and does not count as plagiarism, now is the time to find out.

5.1.3 Acknowledgements

Although the research process is often an individual endeavour, there are many without whom neither the research process nor output would occur. It is therefore important to acknowledge this as extensively as required while limiting it to one page, and having regard to any confidentiality or sensitivities (such as company names). Examples include those providing access to data,

those giving of their time, and those supporting the researcher in various ways. You can include a direct dedication to individuals who have helped or supported you on your research journey.

5.1.4 Abstract

An abstract is a short synopsis that appears at the beginning of a document and summarises its entire content in (usually about) a couple of hundred words. Unfortunately, it is not unusual for an undergraduate student to hastily tack a terrible abstract onto their report at the very last minute, without giving it very much thought at all. This is a mistake as, in academic writing, the abstract is one of the most important parts of a document and will generally be read many more times than the rest of the document. Your abstract should be painstakingly crafted to be the perfect synopsis of your work and to make crystal clear to the reader whether they will find the rest of the document worth reading. Do a quick search on Google Scholar for any subject that interests you. Notice that each result leads to a short abstract summarising a publication of some kind. These abstracts are the way researchers know whether to read a particular paper or not. For every paper a researcher reads, they have probably skimmed the abstracts of many other papers.

The **time per word** you spend writing the abstract should be a multiple of the average for the rest of the document.

The time per word you spend reading the above statement should be a multiple of the average for the rest of this section. With that in mind, go back and read it one more time. Slowly.

Here are some characteristics of a good abstract:

- ✓ Begin by very briefly describing the problem you set out to solve. If possible, state some facts and figures which demonstrate that it's an important problem and one worth solving. For example, if your project concerned the design of an electronic device to assist diabetics in managing their condition, you might state some statistics about the incidence of diabetes in Ireland and elsewhere, and perhaps identify the health benefits associated with better management of it.

- ✓ Clearly state the specific objective of the project, ideally in a single sentence.
- ✓ Describe the actual work carried out, i.e., how you went about trying to solve the problem you have just described. How did you set about achieving the stated objectives?
- ✓ If you designed and implemented something, describe the testing you performed to assess its performance. Explain clearly how you tested it. If you did user testing, how many subjects did you recruit and what did you ask each of them to do?
- ✓ Summarise your results. Be specific. State the actual numbers you measured. If you designed an electric vehicle, how fast did it go? What was its rate of acceleration? What distance did it cover for each battery charge?

An abstract should not include references, although any facts you state will usually be discussed subsequently (with appropriate references) in the main body of the document. You should note that the abstract is just text – there should be no images, equations, circuit diagrams, etc.

5.1.5 Table of Contents

To produce a professional looking Table of Contents, you should use the Multi-level Lists and Headings in your word processor. You will be shown how to do this during the FYP lectures and should get familiar with the tools and methods as quickly as possible. The Table of Contents in this document is typical of how an FYP Table of Contents should be presented.

5.1.6 Lists of Figures, Tables, and Abbreviations

These lists are similar to the Table of Contents and present the captions for your figures and tables in numerical order with their corresponding page number. See the List of Figures and List of Tables at the beginning of this document to see how these should be presented. If you use the “Insert Caption” tool in Microsoft Word, you will be able to generate automatic lists with the correct numbering and page numbers. Every IT research project will have many abbreviations and acronyms in the report. It is useful to provide a list of abbreviations for the reader to refer to. This is simply a list of all the

abbreviations and acronyms that you have used, presented in alphabetical order with their full text alongside. Refer to the List of Abbreviations at the beginning of this document for an example,

5.1.7 Introduction

The Introduction should be like a considerably fleshed out version of the abstract. After the abstract, the introductory chapter is probably the most frequently read section of most project reports. For a final-year project, it should be several pages in length. Like the abstract, it should summarise the problem you tackled in the project and clearly state one or two specific project objectives (perhaps as bullet points). It should describe the methodology you used and summarise the results. Do not keep anything back for a surprise ending. By the end of the introduction, the reader should have a very clear idea exactly what it was you were trying to achieve, why you were trying to achieve it, how you went about it, and how successful you were.

Unlike the abstract, the introduction should include a citation for any fact that is not self-evident. For example, if you state that the use of blockchain technology is increasing in Ireland, you need to back that up with a reference to a specific, reputable source, such as a report with a statistic to prove it. If you are developing a fitness related application and you state that cycling is more energy efficient than walking, you need to provide a reference to a reputable source that supports that statement.

The introduction chapter should also make extensive use of images, diagrams, etc., to help the reader get a good grasp of the problem as quickly as possible. It can sometimes be appropriate to use images from other sources (appropriately acknowledged, of course), but some of the images should be your own original work too. See Section 7 for details of how to work with figures and tables in your document.

5.1.8 Literature Review

The Literature Review is one of the chapters that you will have already submitted as part of the continuous assessment of the FYP. However, the version that appears in the Dissertation will probably be an updated version

of that. This is because you will most likely identify and discover further sources as you progress with your research and work, and you can significantly enhance the Literature Review in the Dissertation by spending some time rewriting it to work in your new sources. This principle will also apply to the other chapters that you will have submitted as part of the continuous assessment and form other sections of the Dissertation.

5.1.9 Methodology and Results

The Methodology section covers three of the deliverables that you have already completed – the Analysis & Design, Implementation, and Testing & Results chapters. These can be presented as separate sections or subsections of one or two main sections, and use whichever approach makes sense for your project. A common approach is to have a Methodology section that describes how you did the project, including your research design and implementation, and a Results section that describes your testing and presents the results. If you are in doubt, discuss the best approach with your Supervisor.

5.1.10 Discussion

This section is similar in many ways to the Introduction, but now with the advantage that you can assume that the reader has read the intervening chapters. You should remind the reader of what the original problem was. Restate the specific objectives of the project and undertake a critical analysis of how well these objectives have been met by your subsequent research. You should attempt to link your findings to your background material presented in the Literature Review and introduce new sources and use citations for these as appropriate.

If you did not achieve your original objectives, this is your chance to describe how you might do things differently if you were starting over. If things did not work out as planned, this may not necessarily be a bad result. Many good conclusions have been drawn from failed experiments. The important thing is that you understand and explain why this was the case. For example, you may have underestimated the amount of time required to implement your design. If you think there are weaknesses in the project, this is your chance to face

them head on and reassure the reader (and the examiners) that you see the flaws and have useful ideas about how they could be addressed.

The main purpose of the Discussion is to tie everything so that you can draw a conclusion.

5.1.11 Conclusions

Many students just tack on the Conclusion section as an afterthought and offer only the most superficial analysis of how the project worked out. Most examiners have read many projects where the conclusion states that everything worked out well, when it is obvious that that was not the case. You should try to be *reflective* with your Conclusion. Creating a piece of reflective writing is different from other academic writing as it is more personal, and you are writing about your experiences. You should try to stand back from the FYP at this stage and reflect on how it went for you. What did you learn from it? Was it a rewarding experience? How would you approach it differently if you had to do it all again? Please note that you should not use this as an opportunity to criticise, rather as an opportunity to think critically about your own experience. It is perfectly acceptable to write this piece in the first person because you are writing about your own experiences and how you felt about them. A good reflective element to the Conclusion can be very important as it will demonstrate your level of engagement with the project and the process of doing it.

In general, conclusions will mention any limitations that you encountered during your project. For example, you may have had a design that required some equipment that could not be sourced, and you could not implement your design fully as a result. You may not be able to draw wider conclusions or make them generalisable because your sample population was not large enough or your test data was not broad enough.

If your work has developed to the stage where you feel it could be taken further, either by you or others, you should include suggestions for further work or research. These suggestions can be some of the most useful things

that come out of research projects and may provide future students with ideas for FYPs or even Level 9 research.

5.1.12 References

Good FYP Dissertations will usually have a long list of references. Of course, it is not just about the quantity, but a lack of references is a sure sign that something is not right. Conversely, a long list of reputable looking references reassures the reader that you researched adequately and that you can back up what you have written with credible sources.

The type of sources you reference is important. Good references are things like publications in reputable journals, reports from government agencies, textbooks, and datasheets. Less reliable references include most web pages. Sometimes, of course, you need to reference web sites, but they should not make up your entire list of references.

References should be formatted neatly and consistently, and according to the specified style for your FYP (see Section 6). In the Department of Information Technology, the style in use is Harvard. Many computer engineering and science articles use the IEEE style. If you wish to use this style, please check that it is acceptable with your supervisor. Whatever style of references you are using in a document (IEEE, APA, Harvard, etc.), you should look up the style guidelines to make sure that you are formatting them correctly. The TUS Library provides a guidance booklet called “Write it Right” which provides a detailed explanation of how to apply the Harvard style. For IEEE style references, complete details are provided in the IEEE Editorial Style Manual.

5.1.13 Appendices

The appendices of your report provide a place where you can provide additional reference material for the reader without disturbing the narrative flow of the main text.

Examples of things that people often include in an appendix are:

- ✓ Complete code listing for any software you wrote during the project.

- ✓ Complete circuit diagram (if the full circuit is too complex to include in the main text).
- ✓ Additional graphs of data or results.
- ✓ Additional screenshots or pictures that are more appropriate in an appendix than in the main body of text.
- ✓ Technical data sheets for any hardware or software that you used in your implementation.

Appendices should be headed by letters and labelled as “Appendix A: Title of Appendix A”, for example. You should apply the appropriate Style so that they get included in your automatic Table of Contents.

5.2 Format

You should begin the FYP by setting up document templates that use the settings outlined in this section, apart from the Margins. The margins for the final Dissertation need to be set wider on the left and narrower on the right to allow for the binding of the document. For the other deliverables, just use the default margins (2.54cm) in Word all around.

5.2.1 Length

There is no minimum length for your final document, but it is mainly through the Dissertation that your project is judged, so the report should adequately reflect the work that you have done. The following is an **indicative** word count for each section of the Dissertation.

➤ Introduction	2,000
➤ Literature Review	5,000
➤ Methodology	2,500
➤ Results	2,500
➤ Discussion	2,000
➤ Conclusions	1,000
➤ Total	15,000

With the addition of figures, tables and supplementary material, you should expect that your Dissertation will be in the region of 100 pages long and may indeed be considerably longer depending on your project.

The Abstract is limited to 300 words and should be strictly kept to a single page. You should work at the Abstract to make maximum use of all the words that are available to you. See Section 5.1.4 for more details on writing the Abstract.

5.2.2 Line Spacing

You should use a line spacing of 1.5 lines in Microsoft Word (the same as this document). Paragraphs should be set to 0pt before and 8pt after (default) and use the default spacing for your headings. If you have indented quotations in your text, these should be presented in single line spacing.

Do not add additional lines between paragraphs – check your paragraph marks by using the ¶ button on the *Home* tab. Similarly, you should avoid having excessive white space in your document by arranging your insertions (figures and tables) in such a way that they appear within the text.

Only main sections need to appear on a new page.

5.2.3 Font

You are preparing your Dissertation for a final version that will be printed and bound. Therefore, you should use a Serif typeface. The recommended typeface is Times New Roman, the point size should be 12pt, and the colour black. If you are included code in your document, it may be presented with an alternative font and size, such as Consolas 9.5 or 10.

5.2.4 Headings

Headings should be presented in the same font for all heading levels, but they should be in **bold** typeface. It is recommended to use multilevel lists with heading levels so that you can keep control of the numbering system and produce an automatic Table of Contents, something which will save you an awful lot of time towards the end of your FYP. You will be shown how to set up document templates in the FYP class with these settings.

5.2.5 Page Numbering

Page numbers should be inserted in the footer of the page and aligned to the right (as in this document). If you have pages in landscape orientation in your

document, you will need to adjust the pages number so that they appear in the right place. See Section 7.1 for further details on how to do this. You are required to use Roman Numerals for all of the pages before the Introduction, so the first time you see a standard number (1) will be the first page of the Introduction. This can be easily done by creating different sections in your document. Appendices should have their own numbering (start at 1) and be numbered separately from each other.

5.2.6 Margins

The margins for the Dissertation need to be set differently to allow for binding the document. They should be 40mm on the left, 20mm on the right, and standard (25.4mm) on the bottom and top. Please do not use these margin settings for the other deliverables.

5.2.7 Justification

Text should be set to fully justified in the Normal Style (or any other style that you use for Body text). This means that the text will be lined up evenly on both sides of the pages, as you would see in a book. Text for anything other than Body text should be left-aligned, including headings, table contents, and Reference lists. It is particularly important not to fully justify Reference lists, as they will not look right.

5.3 Proofreading and Copyediting

Proofreading is the careful checking of each line and each graphic to ensure that the material is expressed in clear, correct English, and checking errors in spelling, punctuation, grammar, format, and sentence structure. See Section 3.5 for details of writing and writing tools to help you with this. When it comes to proofreading your Dissertation, you should probably get someone else (who is good at it) to help with proofing. You can become so invested in your own work that it becomes very difficult to see the mistakes. Remember that how you present your work will indicate your level of professionalism, and if you are not attentive to detail, the quality will suffer and affect your grade.

5.4 Submission

There are two aspects to the submission of your Dissertation. You will submit the final draft as a document in PDF format to your Supervisor (through the VLE) by the deadline specified in the schedule. You must also submit the document to the URKUND plagiarism checking application (also through the VLE). Depending on the report produce by URKUND, you may have to edit your document, so allow enough time to do this. The submission date is set to allow your Supervisor enough time to go through the document and give you feedback so that you can edit it in time for the final submission.

You are required to submit a formal, bound copy of your Dissertation to the Department of IT administration office (2B11) by the deadline on the schedule. This must be accompanied by a spiral bound version, which will be used by the External Examiner. You must also submit a PDF of the final Dissertation to the VLE by the due date.

There are several providers in Limerick that specialise in binding Dissertations, and you will be told about some of these during the FYP lectures. Some of them advertise around the campus towards the end the academic year. You might also wish to get a copy bound for yourself to keep for future reference or to show to potential employers, etc.

5.4.1 Printing

The document should be printed on A4 size white paper with a minimum weight of 80g/m². The document should be printed on **one** side of the paper only.

5.4.2 Binding

Bindings shall be of a fixed type, so that pages cannot be removed or replaced. The front and rear binding boards shall be sufficiently rigid to support the weight of the work when standing upright. The outside cover of the Dissertation needs to contain certain information, shown in Appendix C. The title appears at the top in at least 24pt font (see what looks good depending on the length of your title) and should be centred. Your full name (first name and surname) appears under this, also centred. This will be in a smaller point

size. The award appears underneath this (e.g., BSc. (Honours) in Computer Networks and Systems Management). The year of submission appears underneath this (e.g., 2019). You may place the TUS logo on the cover page if you wish, but you must use a high-quality version if you do. One will be available to download from the VLE or the binder may have a version that they use for TUS dissertations.

The spine of the document must also include some information so that it can be identifiable on a library shelf. You need to include your name, the year, and the award, which can be abbreviated if it is too long to fit (e.g., BSc (Hons) CNSM).

The font used for the cover page should be selected to look good. The font used in the sample cover page is Georgia.

6 Citations and Referencing

Refer to Sections 4.2.1 and 5.1.11 for additional information on referencing for Literature Reviews and the Dissertation.

There are several reasons why you need to identify your sources when writing. Not least, providing a list of references proves that you have done some research and read something. Citations also support your ideas and arguments. When you use established work to underpin your research, it can lend considerable weight to your viewpoint. Citations are useful for linking other people's work together, such as in a literature review, and it is important to acknowledge other people's work.

In academic writing and research, you cannot make statements and claims without providing a source for them. For example, if you wrote that "68% of people living in rural Ireland do not have access to a fibre connection", and you do not provide a source for that information, how would the reader know that the statistic is true? By providing a source (such as the Central Statistics Office), the reader can look up the reference and then go and find exactly where that statement came from.

A common misconception amongst students is that the inclusion of many direct quotes in the FYP will demonstrate that the student is well read in the subject area. Academic writing, on the contrary, uses direct quotes sparingly. You can better demonstrate that you understand what you have read in the literature by **paraphrasing** the experts from whom you are drawing your ideas. However, in some circumstances, you will wish to quote directly because the reference is expressed particularly succinctly or eloquently.

6.1 Plagiarism

One of the more important reasons for citing is to avoid plagiarism. Plagiarism is direct quotation or word-for-word transcription from other works, mixing paraphrase and unacknowledged quotations, or **unacknowledged** paraphrase and/or use of ideas. It is essentially using someone else's work without acknowledging it. In student works, plagiarism often results from either ignorance or carelessness. By familiarising yourself with both the letter and

spirit of the definition provided above, carefully documenting all reference sources and taking the time to summarise material in your own words (as well as subsequently verifying the accuracy of your summary), plagiarism can be avoided.

What many students do not realise is that plagiarism is very easy to detect. If you go about copying and pasting segments of text from different source into your own work, it will quickly resemble something like a patchwork quilt. There will be no flow to your writing and your style will sharply contrast with the pieces that you have copied. It is probable that your examiners are very well read in the subject matter of your research and will recognise work from other sources. You are also required to submit your work to an application that checks the plagiarism levels in it. If your score is above a certain level, your submission will be rejected.

The basic rule of thumb here is, if in doubt – provide a reference.

6.2 Reference List or Bibliography

It is important to understand the difference between a Reference List and a Bibliography. A reference list is the detailed list of references that are cited in your work. A bibliography is a detailed list of references cited in your work, **plus** the background readings or other material that you may have read, but not actually cited. Some FYPs may contain a Bibliography, others a Reference List, but two lists should not be present in your work – use one or the other.

6.3 Style

Although there are many different referencing styles available, the Department of Information Technology uses the TUS version of the Harvard style. There are very specific rules you must follow when using this style. Full details of the style are available from the TUS Library, and they have a booklet called ‘Write It Right – A Guide to the Harvard Referencing System’. One of the first things that you should do is equip yourself with a copy of this (although you should have one since first year).

6.4 How to Cite Sources

One of the most important aspects of referencing is that there is consistency between in-text citations and the Reference List. No source should be in the Reference List that does not appear in the body of the text and no reference should be cited in the body of the text that does not appear in the Reference List.

Citing a source is relatively straightforward and becomes an integral part of your writing with a little practice. There are a couple of rules to follow for any particular style and the built-in tools in the software will help you with these. It is very important to use one of the available tools to get the citations and reference list correctly formatted (see Section 3.3 for details on software).

On their first attempts at referencing, many students will include the title of the source and the author's full name in the body of the text. This is **not** correct. Using the Harvard (TUS) style, only the author's **surname** and **year** of publication are included in the text of the document. Where there is a direct quotation, the page number(s) are also included. Full details of the reference are then included in the Reference List. One of the best ways to learn how to do this correctly is to have a look at a journal paper that uses the same style. See how the citations appear in the text and look at the detail and layout of the reference list.

There are two methods of citing sources within your text. The more common method used by early-stage researchers (you) is to make a claim, summarise or paraphrase a source, or use a direct quotation, and follow this with the author's surname and year of publication in brackets. For example, if you wanted to use something in this document as your source material and cite it, you would insert (Corcoran, 2019) **after** you use the material. This type of citation will appear at the end of paragraphs, sentences, and phrases. If it is at the end of a sentence, it appears **before** the full stop.

The second method is slightly more advanced and used where you want to work the author into the point that you are making. For example, you might wish to say that Corcoran (2019) claims that there are two methods for citing

source in your writing. Note that the author's name is not enclosed in the brackets in this case, only the year of publication. This is a useful method of working citations into your writing to help with style and flow. An over reliance on the first method can lead to a stilted style that can be difficult to read. There are many standard words and phrases that you can use to achieve this, such as "According to Corcoran (2019), ...", or "In a recent study, Corcoran (2019) found that ...", etc.

There are two other things that slightly alter the way that these citations are done. One is the number of authors that are associated with the source and the other concerns the use of a direct quotation. If there are two authors, then they both appear in the citation, in the order in which they are in the source. For example, (Corcoran & Ryan, 2019). If there are more than two authors, **et al** is used with the first author. Et al is an abbreviation of the Latin phrase *et alia*, which means "and others". For example, "The work of Corcoran et al. (2019) emphasises the importance of citing properly."

Finally, if you place a direct quotation in your work from a source, you must include the page number that the quotation appears on. For example, Corcoran (2019, p. 38) states that "an over reliance on the first method can lead to a stilted style that can be difficult to read".

6.4.1 Some Problems

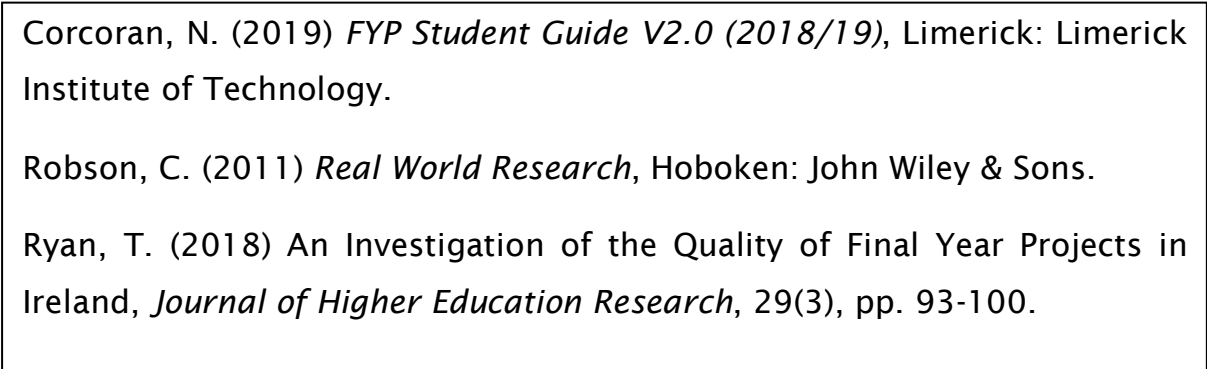
One of the difficulties with referencing for technical subjects, such as computer engineering or science, is that you will have a lot of material coming from sources that have no discernible authors or dates associated with them. If there are no authors, then you will have to make up something to insert the citation. This is most commonly done by creating an abbreviation or acronym from the source. For example, if you wish to cite information from a 2016 report from the Central Statistics Office that has no individual author listed, then you might use an acronym of CSO to create a citation of (CSO, 2016). The general rule of thumb with these is to keep them short while trying to retain some meaning.

In other cases, you will not be able to find a date of publication for your source. Sometimes, these can just be hard to find, and you need to do some detective work to uncover them. There are two places in documents where publication dates generally appear – on the first couple of pages, or at the end. If you simply cannot find a date, you can insert n.d. in the citation, so (Corcoran, n.d.). This convention should only be used as a last resort and there should be very few of these in your work.

One additional convention that may be useful is the use of **ibid** instead of the author. Ibid is an abbreviation for the Latin word *ibidem*, meaning "in the same place", and is used to save space in textual references to a source which has been mentioned in a previous reference. For example, (ibid, p.41). This is most commonly used if you are relying on a single source for a particular section in your work.

6.5 Reference List

The Reference List (or Bibliography) is a list of all of your citations presented in alphabetical order by author name at the end of your document. This allows the reader to easily find the publication in the list from your citation. The style applies very strict formatting to how the reference appears in the list, and there are different formats for different types of sources, such as journal articles, books, and websites. That is why it is so important to use a referencing tool. It is unlikely that you will succeed at producing a proper reference list on your own. A reference list will look something like this:



Corcoran, N. (2019) *FYP Student Guide V2.0 (2018/19)*, Limerick: Limerick Institute of Technology.

Robson, C. (2011) *Real World Research*, Hoboken: John Wiley & Sons.

Ryan, T. (2018) An Investigation of the Quality of Final Year Projects in Ireland, *Journal of Higher Education Research*, 29(3), pp. 93-100.

Figure 1. Sample Reference List

The style dictates what needs to be in the reference, what is in italics, when you need to put in volume, issue, and page numbers. Make sure that you do not fully justify the reference list as many of the references will become skewed, particularly where you need to include website addresses (URLs). The reference list should be left justified.

7 Figures and Tables

The use of figures and tables in your dissertation is a great way of helping the reader to understand what it is you are trying to describe, and a powerful supplement to support the point you are making in your writing. They should be used where appropriate and do not be afraid to put in plenty of them. However, they should be relevant and well placed/spaced within your document. **Figures** are graphs, diagrams, or illustrations/images, whereas **tables** are data presented in tabular form.

There are several things that you need to consider when presenting figures and tables in your work, and it may take a little practice to get some of them right. You will probably need to use things like Section Breaks a good bit, particularly if you have larger items to insert that may require a changeover to Landscape view for a page. These breaks are normally hidden from view, but you can turn on a formatting view that will reveal elements such as page and section breaks, paragraph breaks, line wraps, tabs, etc. To turn on this view in Microsoft Word, click the ¶ button on the *Home* tab, in the Paragraph block immediately to the left of the horizontal styles list.

7.1 Placement and Sizing

Although it is possible to flow text around an image, there is a simpler approach that is less prone to causing errors and spacing/text-flow anomalies. Figures should always appear after the end of the paragraph in which they are first referenced, or as close as possible to that point to avoid having gaps between areas of text. Do not interrupt a paragraph or a sentence to insert a figure or table.

Figures and tables should be left-aligned and appropriately sized so that the information that they are presenting is legible for the reader. You have a few options to do this. You can keep the figure or table to a minimum size that you feel is adequate for someone to interpret (see Figure 1), you can size the figure or table to the width of the page (see Figure 2), or you can use a page in landscape orientation (see Figure 3). Pages in landscape can be difficult to get right and it takes some practice to use them without messing up your document, particularly the page numbers. There are several online tutorials

that will help you with the process and you will also be shown how to do it in class.

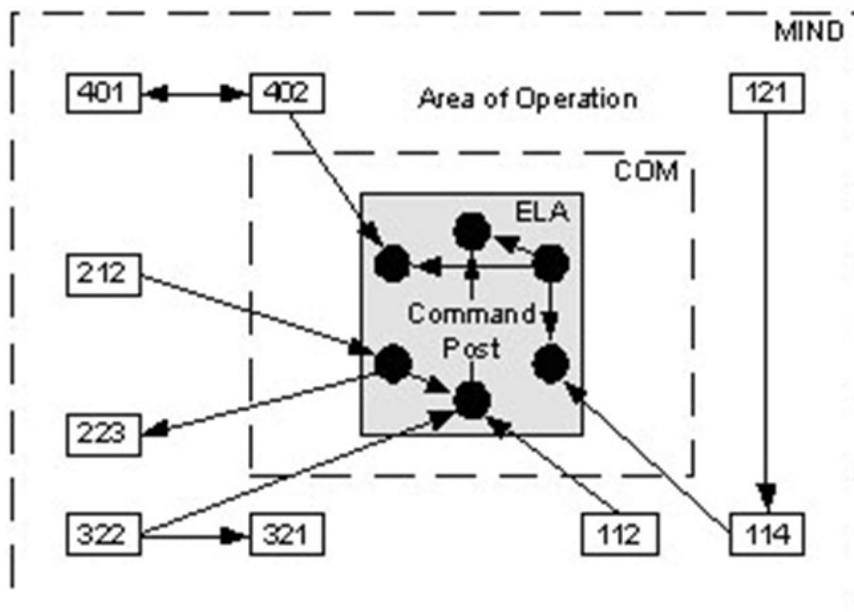


Figure 2. Sample figure kept small

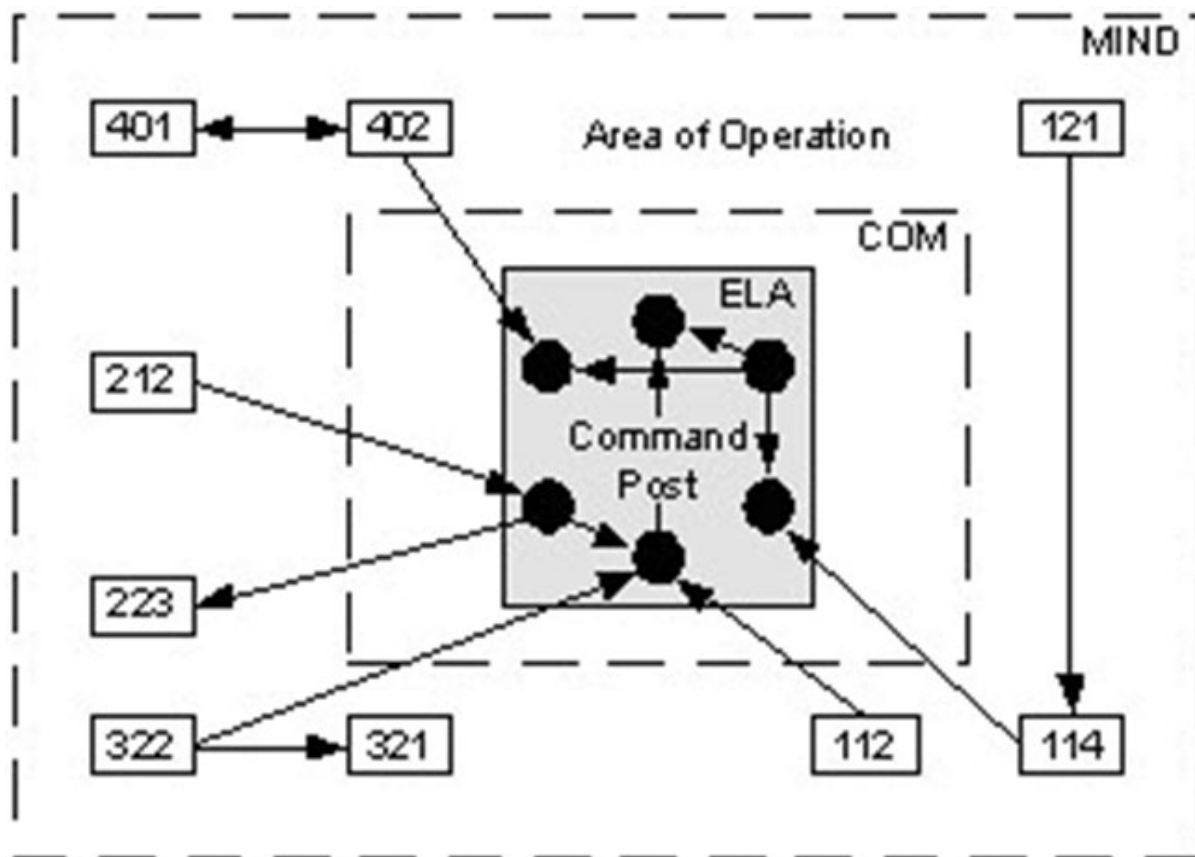


Figure 3. Sample figure using the page width

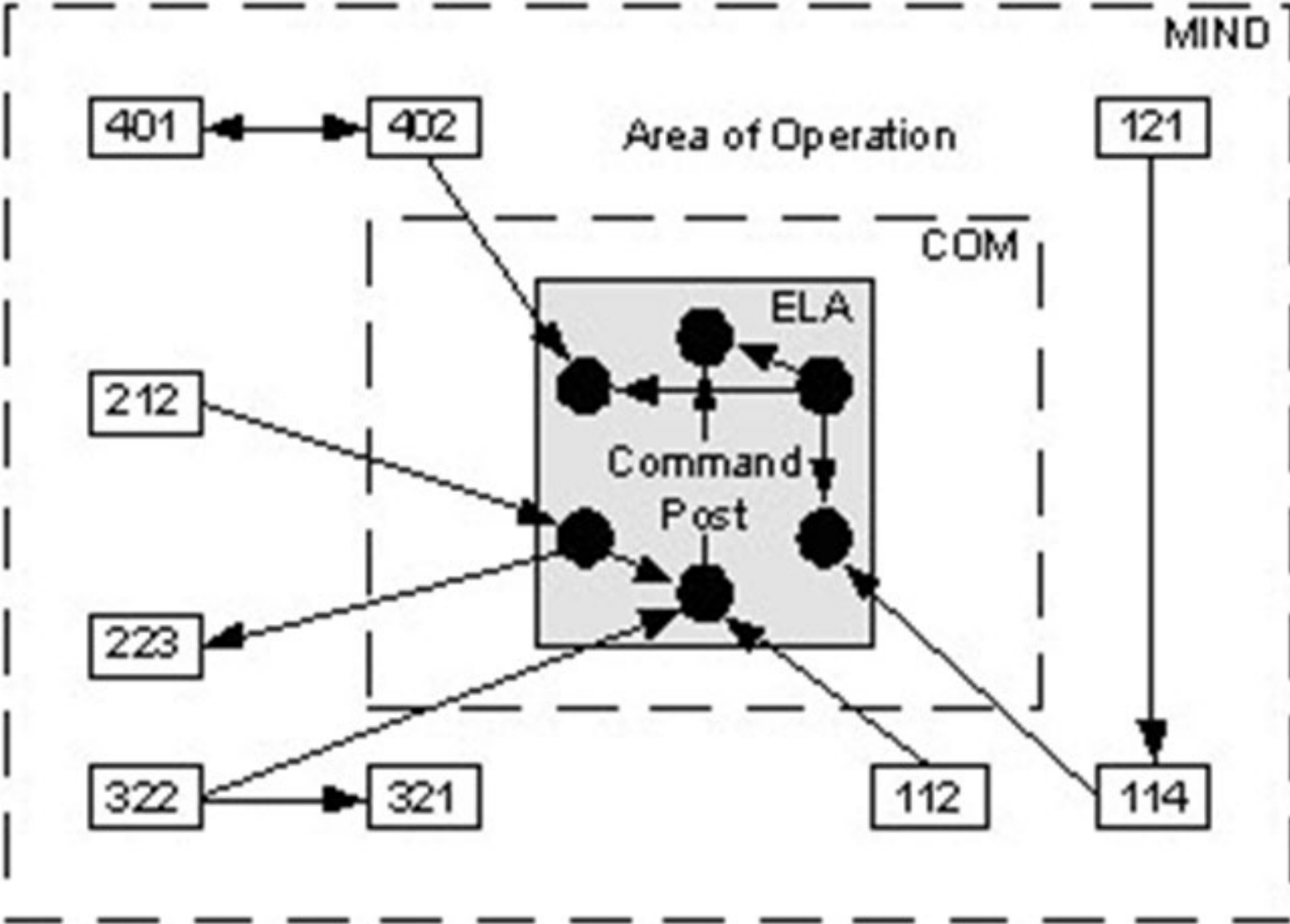


Figure 4. Sample Landscape Figure

If you are using tables, you can either insert and format them in your word processor or in an external application (e.g., Excel) and import into your document. Whichever way you choose to do it, you must ensure that your tables are clearly presented and appropriately labeled. Table 2 shows an example of a well-presented table.

Name	ID	Column A	Column B	Column C
A	1	x	y	z
B	2	x	y	z
C	3	x	y	z
A	4	x	y	z
B	5	x	y	z
C	6	x	y	z
A	7	x	y	z
B	8	x	y	z
C	9	x	y	z

Table 2. Sample Table

7.2 Labels and Captions

Every figure or table that you insert must have a label/caption and must be referenced in the text. For example, if your first figure is labeled “**Figure 1.** This is a Description of the Figure”, then you must reference Figure 1 at some point in the preceding text, and this can be done by saying “see Figure 1” or “Figure 1 illustrates that...”. Labels must be placed directly under the figure or table and briefly explain what it is.

It is important that the caption does not get separated from its figure or table and this can easily happen especially when you are putting a large document together. There are some things that can be done to avoid separating a caption from a figure or table. One method is to create a two row, single column table, place the image in the top row and the caption in the bottom, and then use the Table Properties to prevent the Table from breaking across pages. A simpler way may be to create a new Style (perhaps call it “Keep With Caption”) and set the “Keep With Next” property in the Format Paragraph Dialogue. After inserting a graphic, apply the new style to it and it should then always stay

with the caption that comes after it. Make sure that you change back to Normal Style for what comes after.

7.3 Order of Insertion

Figures and tables should be inserted and numbered sequentially in your document, with separate number lists for both figures and tables. These lists should start at 1 and continue in order of appearance through the document. Do not precede figures and tables with Chapter numbers (e.g., 3.1, 3.2, 4.1, etc.). Figures should begin with Figure 1 and tables with Table 1. A List of Figures and a List of Tables must be inserted in your document just after the Tables of Contents (see Section 5). These lists contain all the figures and all of the tables in sequential order with their descriptions and page number on which they appear:

List of Figures

Figure 1. Sample Figure	1
Figure 2. Keep With Caption	2

Note that these lists can be created automatically by Word if you use the “Insert Caption” option in the References Tab, in a similar fashion to an automatic Table of Contents. However, Word applies a default Caption Style to the captions so you will need to modify this to reflect the FYP dissertation requirements. Again, these tools take a bit of practice to get right.

7.4 Quality

If your graphics are not of sufficient quality, it will significantly detract from the appearance of your document. Figures and table must be presented so that the detail in them is clear and legible. There is no point in presenting data if no one can read it. When including screenshots, pictures, or other images, ensure that the resolution is high enough for the graphic to be seen clearly. If you are using a lot of tables or tables with a lot of data, you may wish to use Excel to create and edit your tables and charts, and then insert them into your Word document as an image. This can be useful in large documents when you are presenting the final versions of tables and charts that do not require any

further editing. You can insert figures and tables into documents directly from Excel and this can be useful if you will be changing parameters or values in your data which will then automatically update in Word. However, if your data is finalised, it may be simpler to insert these into your document as images.

7.5 Citing Sources

If you use a figure or table from another source (i.e., something that you did not create yourself), you must provide a citation for the source. Please be aware that much of the material that you find online, including images, is copyrighted, so you must make sure that you are entitled to use it. If you need to cite the source of a figure or table, it can be done as shown in Figure 4. It is similar to citing anywhere else in your document and the citation detail must appear in your Reference List. See Section 6 for full details on referencing.

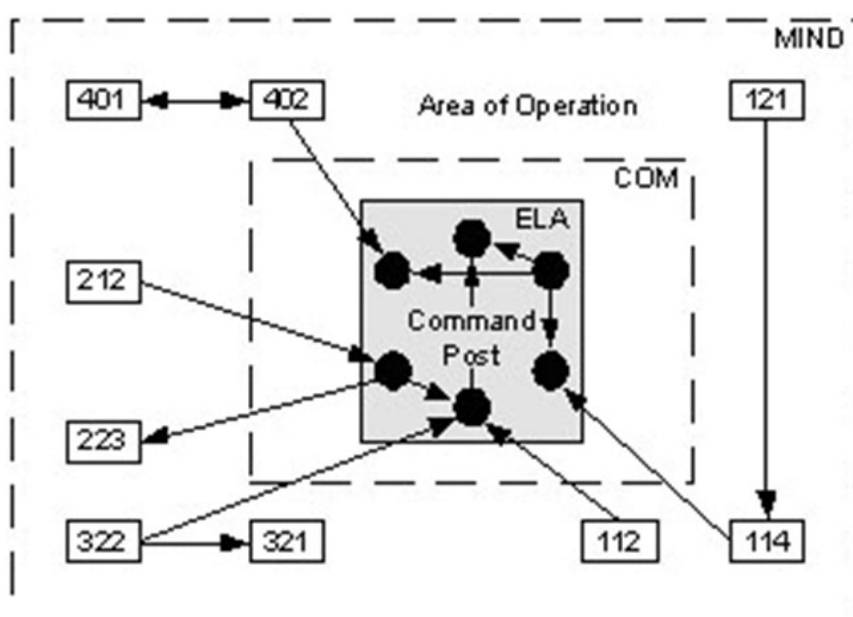


Figure 5. Sample figure with citation (Corcoran, 2019)

8 Technical Interview

The Technical Interview is similar in format to the Proposal Presentation that you had at the beginning of the FYP. You will be presenting your work to a panel of academic staff that will include your Supervisor and at least one other staff member. The presentation will most likely be a combination of a slide presentation and a demonstration of whatever your implementation is. It is important that you arrange suitable facilities with your Supervisor if you need access to specialist equipment, etc. The presentation will be followed by questions from the academic staff present so you will need to know every aspect of your project in detail, including a good knowledge of the underlying theory bases, background and methodologies used.

The Technical Interview also gives you a chance to present and explain your poster and you should use the poster as an integral part of your presentation.

You should present yourself properly for the Technical Interview and approach it as a formal examination. You should prepare for it by ensuring that you know your subject matter, implementation, and Dissertation in minute detail.

9 Ethics in Research

There can be many legal, ethical, social and professional issues encountered when conducting computer science research. It is vital to consider ethics when undertaking any research, and there seems to be a conception that computing projects or FYPs in general are exempt from ethical considerations. You will gain an understanding of ethics in IT from some of your modules and this may help you to develop your knowledge of ethical considerations for research.

The underlying principle of ethical research is to **do no harm**. This appears a simple statement, but applied to research, it becomes a multifaceted issue covering aspects such as anonymity, confidentiality, legality, informed consent, duty of care, integrity, competence, and objectivity. Many projects will not require ethical approval, which is a formal process that you must go through with your supervisor. However, several projects will require approval. If your project involves any of the following practices, then you will have to seek ethical approval from your Supervisor:

- ✓ working with people
- ✓ working with data that is not your own
- ✓ gathering data using surveys or questionnaires
- ✓ interviewing subjects (including Focus Groups)

At the very least, you will need to discuss ethics with your supervisor, and if required, complete and submit a form for ethical approval. Your Supervisor will have a copy of this form, and it is also available in the *Research Ethics Guidelines for Undergraduate and Taught Postgraduate Programmes* document, which you can find on the VLE. You should read this document before you proceed with your research, and you should also include a section in your Methodology describing how considered and dealt with ethical issues.

10 General Advice

This document has been prepared to give you as much information as possible to help you get through your FYP. From supervising FYPs over many years, we have learnt what works for students and what does not – these are some general tips that will help you along the way.

1. Go to the FYP Lecture every week, or at least as often as you can. This is focused on the different deliverables during the project, and you will pick up lots of extra information by attending.
2. Meet your Supervisor every week and listen to them.
3. Use the training services provided by the TUS Library – they have several sessions on finding information, writing, and referencing every academic year.
4. Work on developing your FYP topic and research objectives during your Work Placement. If you come back to college in September with no idea of what you want to do, you will be already behind. A good start with the FYP is vital if you want to avoid excessive pressure during Semester 2.
5. It is common for students to leave the majority of the write up and collation of the deliverables to the last minute. This will not give you adequate time to produce a quality Dissertation as they take time and care.
6. Keep a journal. When you are researching, you will come across many things of interest and think of things at the most unexpected times. You should have a dedicated **Research Journal** to take note of these instances. Writing things down also helps with your thought processes and can be a great way to help with the development of ideas. When it comes to writing up, if you have been writing everything down, and taking notes of sources, etc., it will be a great help to have all of those things to hand.

Appendix A – Sample Title Page

**This is the Title of My Final Year
Project and Appears in Title Case
and is Centred**

**Firstname Surname
Student ID**

A Final Year Project submitted in partial fulfilment of
the requirements of Limerick Institute of Technology
for the degree of Bachelor of Science (Honours) in
<insert course name here>.

Supervised by:
(Title) Firstname Lastname



TUS
Midwest
Department of
Information Technology

Month, Year

Appendix B – Sample Ethical Declaration

Ethical Declaration

I declare that this project and document is wholly my own work except where I have made explicit reference to the work of others. I have read the Department of Information Technology Final Year Project guidelines and relevant institutional regulations, and hereby declare that this document is in line with these requirements.

I have discussed, agreed, and complied with whatever confidentiality or anonymity terms of reference were deemed appropriate by those participating in the research and dealt appropriately with any other ethical matters arising, in line with the LIT Research Ethics Guidelines for Undergraduate and Taught Postgraduate Programmes policy document.

[Type name here]

[Date]

Appendix C – Sample Cover and Spine Binding

